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By-Watley, Donivan J.; Nichols, Robert C.

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The prospective major fields of study and career plans of National Merit Finalists are recorded on the scholarship application forms submitted during the students' senior year in high school. (Finalists are selected from the top 1% in measured scholastic ability.) A study of the answers given from 1957-67 indicates that interest among boys in the physical sciences increased immediately after Sputnik but declined until about 1963 when it stabilized. Interest in the social sciences declined in 1958 and 1959 but increased until 1965 and has declined slightly since then. The choice of engineering decreased sharply after 1957 but began to stabilize about 1962 and has been relatively steady since. Interest in teaching increased among both sexes until about 1962 when girls, but not boys, began to show a declining interest. Business and other practical fields have shown steady declines, the reverse of a rising trend of interest in the humanities. The trends seem to reflect genuine changes rather than chance fluctuations. They are statistically significant and many have persisted for several years. If these educational major and career decisions are considered representative of all students in the top 1% , many of the temporal shifts observed are large enough to have a marked effect on the availability of talent for certain fields. (JS)

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Career Decisions of Talented Youth: Trends Over the Past Decade

Donivan J. Watley and Robert C. Nichols

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NATIONAL MERIT SCHOLARSHIP CORPORATION

NATIONAL MERIT SCHOLARSHIP CORPORATION

John M. Stalnaker, President

The National Merit Scholarship Corporation was founded in 1955 for the purpose of annually identifying and honoring the nation's most talented youth. Merit Scholarships, which are awarded on a competitive basis, provide financial assistance that Scholars use to attend the colleges of their choice.

The NMSC research program was established in 1957 to conduct scholarly research related to the source, identification and development of intellectual talent. NMSC Research Reports are one means of communicating the research program's results to interested individuals.

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ABSTRACT

Various trends were found in the educational major and career choice decisions of National Merit Finalists over the past decade. If these decisions are considered representative of students in the top one percent of measured scholastic ability, many of the temporal shifts observed are large enough to have a marked effect on the availability of talented people to work on the problems associated with different career fields.

CAREER CHOICES OF TALENTED YOUTH: TRENDS OVER THE PAST DECADE

Donivan J. Watley and Robert C. Nichols[1]

How many scientists and engineers will be trained next year? Will enough teachers be available in the future to relieve current shortages? Are the most capable students studying in the fields where their skills are most needed?

Considering the importance of questions such as these, it is paradoxical that the answers will be provided not by manpower experts aware of national employment needs, but by thousands of bright but inexperienced youngsters just beginning their careers.

The choice of a career is a personal decision. It may be based on an assessment of one's interests and abilities in the light of anticipated opportunities; it may be the result of drifting in the direction of least resistance; or it may be the resultant of many pressures and suggestions from teachers, family, and friends. However made, few would contest a young person's right to decide for himself.

In the aggregate, however, the early career decisions of able youth determine the future supply of talent available to the various career fields. This is particularly true of those occupations that require high levels of ability and long periods of specialized training because long-range educational planning is necessary to enter these fields and occupational mobility is reduced once an initial choice is made.

This study is concerned with the career decisions of the nation's most talented young people just prior to their entrance to college. An opportunity to study the temporal trends in the career decisions of these students is

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[1] Robert C. Nichols, a member of the NMSC research staff when this study was done, is now professor and chairman of the Department of Educational Psychology at the State University of New York at Buffalo.

provided by information obtained from the annual nationwide talent search conducted since 1956 by the National Merit Scholarship Corporation. Since the National Merit Finalists selected each year are in the approximately top one percent in academic ability of the high school juniors in each state, these students may be ccnsidered as representative of the nation's best brainpower. Where have these highly able youth chosen to devote their talents? When this question was studied several years ago (Nichols, 1964), it was found that interest in careers in scientific research and in engineering was declining. Has this trend continued?

Method

The number of students who have taken the National Merit Scholarship Qualifying Test and the number chosen as Finalists each year since 1957 are shown in Table 1. Last year, in 1967, almost 800,000 students took National Merit's three-hour aptitude test and the 14,149 highest scorers by state were named Merit Finalists. Merit Finalists groups were studied previously (Nichols, 1964), although in the earlier report they were called Semifinalists. Although the number of students participating in the Merit Program has increased

Table 1

Numbers of Students Tested and Numbers of Finalists Selected in the Merit Scholarship Program from 1957 to 1967

Year	Number of High Schools	Number of Students Tested	Number of Finalists Selected
1957	12,503	166,592	7,496
1958	13,752	255,942	7,620
1959	14,454	478,991	10,334
1960	14,549	550,000	10,181
1961	15,095	586,813	10,542
1962	15,461	576,435	10,444
1963	16,024	596,241	11,128
1964	16,577	700,645	13,098
1965	17,162	806,991	14,025
1966	17,605	783,263	14,247
1967	17,488	790,262	14,194

substantially since it began, the average ability of the Finalist group has remained roughly the same each year. This is because the total group of participants from which Finalists are selected has become less selective as it has grown in size.

The prospective major fields of study in college and the career plans of Finalists were obtained on the scholarship application form during the students' senior year of high school. From 1957 through 1960 these instructions were given: "What will be your major field in college and what do you plan for your long run career? Be as specific as you can; e.g., list mechanical engineering (not engineering), teaching high school physics (rather than teaching), etc. It is to your advantage to give some choice rather than write undecided." The instructions given from 1961 to 1967 were identical except for the last sentence which read: "If you are not sure what field you wish to enter, you may write undecided." This change, as expected, increased the percentage of students who indicated indecision about their plans; however, it probably did not have a great effect on the distributions of students among fields for those indicating a choice. Thus, the Finalists who did not designate specific choices were not included in the frequency totals used to calculate the proportions of students in the various major and career field categories.

The major and career choices of Finalists were coded and then categorized into the various groups shown in Tables 2-5. The same coding procedure, which was initially developed in 1957 for career fields and in 1958 for educational majors, was used for all of the Finalist groups studied.

Results

The percentage of Finalists choosing the various career fields is shown in Tables 2 and 4, and the percentage choosing the various college major fields is given in Tables 3 and 5.

The physical sciences, engineering, teaching, law and medicine have consistently been the most popular career choices for boys. For girls the most popular career fields were in the physical sciences, teaching, medicine, government service, and writing.

Thus the most rapidly developing intellectual fields over the last decade and the ones with the most widely publicized needs for talent--scientific research, teaching, and engineering--drew the major portion of the nation's best intellectual talent. Superior students are undoubtedly attracted by the intellectual challenge offered by these fields as well as by the currently favorable employment opportunities. Additional clues to factors presently influencing career decisions may be found by observing changes in the popularity of occupational choices during recent years.

Table 2 shows that careers in the physical sciences, the most frequent choices for boys during the period covered, showed a sharp increase in 1958 and a gradual return to the initial level. The sharp increase in 1958 was partly at the expense of engineering, which showed a dip that year. It is interesting to speculate about the extent to which this shift in popularity of fields might be a response to the Sputnik lauchings in late 1957.

Further information about the career selection practices of talented youth is provided by their prospective college majors shown in Table 3. Their interest in the physical and natural sciences is reflected in the popularity of majors in biology, chemistry, mathematics, and physics. The percentages of boys choosing these majors over the ten year period covered are plotted in Figure 1. As may be seen, physics was the choice of 18.8 percent of the boys in 1958, immediately after the first space exploration successes, but steadily declined for a number of years thereafter. There has been little decline, however, since 1963. Whereas chemistry held a relatively steady course over the entire decade, mathematics

Table 2

Percentages of Male National Merit Finalists Choosing Various Careers

Career Choice	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967
Architecture		3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%
Business	5.0%	4.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%
Engineering	22.0%	21.0%	20.0%	20.0%	21.0%	18.0%	21.0%	21.0%	21.0%	19.0%	19.0%
Farming		3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	
Government Service	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%
Law	6.0%	5.0%	6.0%	7.0%	8.0%	7.0%	9.0%	9.0%	10.0%	10.0%	10.0%
Medical Science	9.0%	9.0%	10.0%	9.0%	10.0%	11.0%	10.0%	12.0%	10.0%	10.0%	11.0%
Ministry	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%
Psychology	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%
Physical Science	20.0%	20.0%	20.0%	20.0%	21.0%	20.0%	20.0%	20.0%	21.0%	20.0%	20.0%
Social Work	3.0%	3.0%	3.0%		3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%
Teaching	7.0%	8.0%	10.0%	10.0%	12.0%	14.0%	12.0%	12.0%	12.0%	13.0%	14.0%
Writing	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%
Other	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%
Number on which percentages are based	4000	3993	4178	4000	4000	3994	4000	4000	4000	4000	4000
Number undecided	2000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Total number	5000	5000	5178	5000	5000	4994	5000	5000	5000	5000	5000

Note.--Blank cells indicate that a field was not ranked in that year and was included in "other."

Table 3

Percentages of Male National Merit Finalists Choosing Various College Major Fields

Major Field	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967
Architecture	1.0%	0.8%	0.8%	0.9%	1.0%	1.0%	1.0%	1.0%	0.8%	1.0%
Biology	0.9%	1.0%	1.0%	1.0%	0.9%	1.0%	1.0%	1.0%	1.0%	1.0%
Business	0.8%	0.8%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Chemistry	4.0%	3.0%	4.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%
Engineering total	23.0%	22.0%	20.0%	23.0%	23.0%	23.0%	23.0%	23.0%	23.0%	23.0%
Aeronautical	0.7%	0.8%	0.9%	1.0%	1.0%	1.0%	0.9%	0.8%	0.9%	0.9%
Chemical	3.0%	3.0%	3.0%	4.0%	3.0%	3.0%	3.0%	0.8%	0.9%	0.8%
Civil	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	0.9%	1.0%
Electrical	10.0%	9.0%	8.0%	7.0%	7.0%	6.0%	6.0%	7.0%	7.0%	7.0%
Mechanical	3.0%	3.0%	3.0%	2.0%	2.0%	2.0%	3.0%	3.0%	3.0%	3.0%
English	3.0%	2.0%	3.0%	3.0%	3.0%	4.0%	4.0%	4.0%	3.0%	4.0%
Geology	0.6%	0.6%	0.6%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%
History	1.0%	1.0%	1.0%	1.0%	2.0%	3.0%	3.0%	3.0%	3.0%	3.0%
Journalism	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%
Languages	0.6%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Mathematics	8.0%	11.0%	12.0%	13.0%	14.0%	16.0%	13.0%	13.0%	14.0%	14.0%
Philosophy, Religion	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Physics	10.0%	10.0%	10.0%	14.0%	14.0%	12.0%	12.0%	10.0%	11.0%	11.0%
Pre-Medicine	6.0%	6.0%	6.0%	8.0%	7.0%	6.0%	7.0%	7.0%	7.0%	6.0%
Psychology	0.9%	0.9%	0.9%	1.0%	0.9%	1.0%	1.0%	1.0%	1.0%	1.0%
Social Sciences	7.0%	7.0%	9.0%	11.0%	10.0%	10.0%	9.0%	11.0%	12.0%	11.0%
Number on which percentages are based	5000	4933	4847	4773	4842	4998	5019	5000	5000	5000
Number undecided	111	294	261	246	309	304	323	353	336	327
Total number	5207	5733	5708	5825	5854	5402	5842	5853	5736	5746

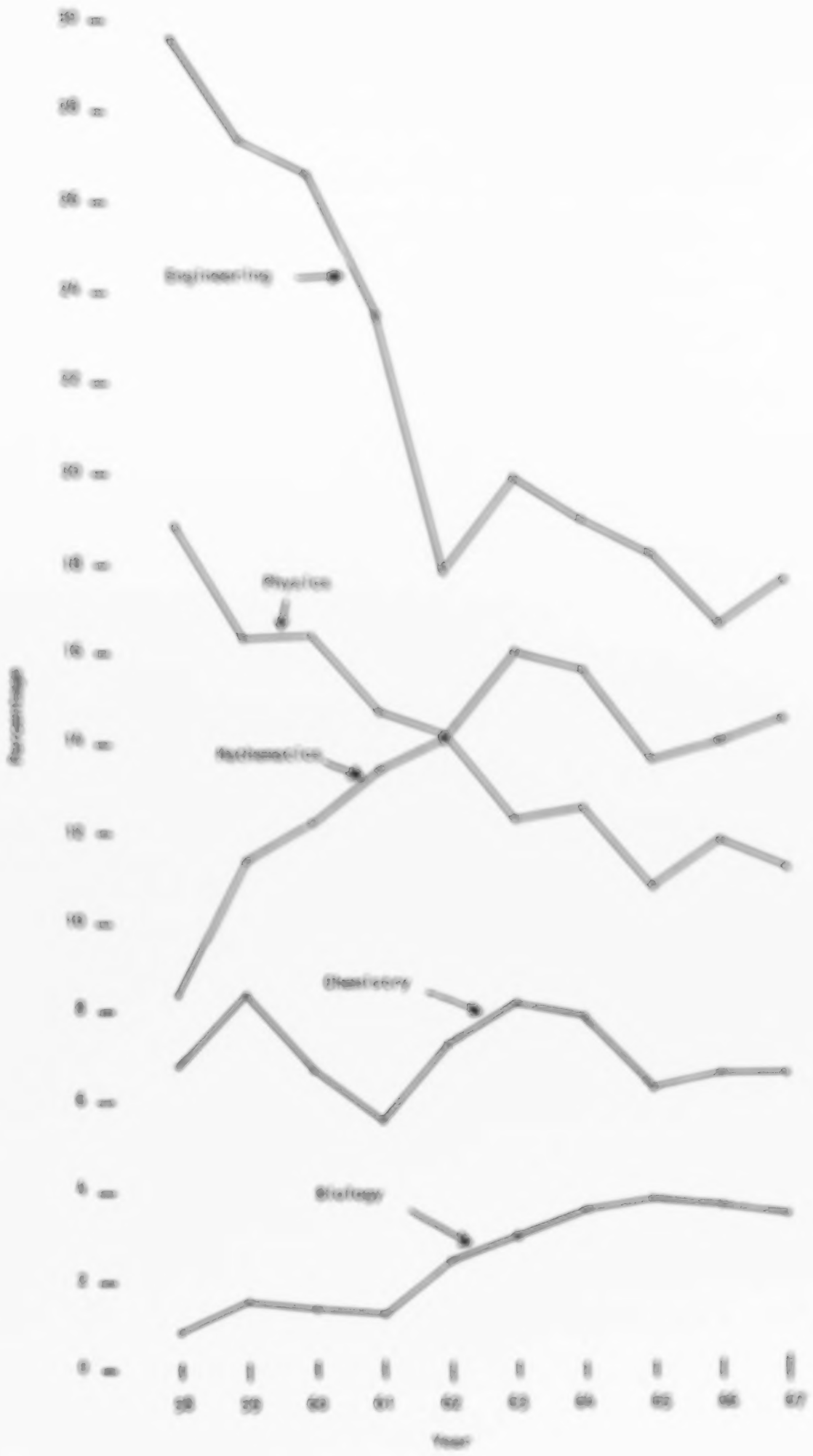

Fig. 1 Percentages of male National Merit Finalists planning to study in various fields in college

was the choice of increasing proportions of boys, reaching its peak in 1963. Interestingly, the totals choosing these four majors have been roughly the same each year; losses in physics have been compensated for by corresponding gains in mathematics and biology. Table 4 shows that the physical sciences have also been frequent career choices of girls, second in popularity only to teaching. Except for the "Sputnik" effect in 1958 and a slight increase in 1960, it has remained fairly stable until 1965 when a drop in interest began that has continued to the present. Figure 2 shows that there has not been a corresponding drop in the selection of biology, chemistry, or physics majors in the past five years.

From its high in 1957, engineering was chosen by a smaller percentage of boys each year until a low was reached in 1962, and there has been no definite trend since then. Of the various engineering specialties, chemical showed the largest proportional decline and aeronautical the smallest. Without exception, however, electrical has been the most frequently selected engineering program each year.

Teaching has consistently been the most common choice among girls, varying from about 37 percent in 1957 to its peak of 42 percent in 1962, then dropping to 35 percent in 1967. Although proportionally fewer boys chose teaching careers than did girls, a substantial growth trend is evident for boys from a low of 8 percent in 1957 to a high of 14 or 15 percent from 1962 to the present. Interest in teaching at the primary, secondary, and college level is not differentiated in the tables because, regrettably, the career choice codes used in the early years did not make this differentiation. However, among the 1957 career choices of girls, 76 percent of those choosing teaching indicated a preference for the elementary or secondary levels, 11 percent indicated a preference for the college level and 13 percent indicated a preference for some educational specialty

Table 4

Percentage of Female National Merit Finalists Choosing Various Careers

Career Choice	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967
Architecture		0.31	0.75	0.60	0.27	0.34	0.67	0.41	0.34	0.62	0.82
Business	4.62	4.08	2.27	2.58	2.28	1.89	1.40	0.73	1.50	1.10	0.90
Engineering	2.57	2.06	2.05	1.31	1.50	1.17	1.05	1.25	1.01	1.15	1.47
Farming		0.04	0.03	0.00	0.07	0.08	0.04	0.03	0.09	0.07	0.05
Government Service	5.00	4.04	5.44	7.03	7.02	7.81	7.06	5.81	5.82	5.30	5.68
Law	1.04	0.83	1.37	1.12	1.23	1.28	1.79	1.81	2.19	2.07	2.21
Medical Science	12.09	11.77	12.53	11.70	12.44	11.69	12.82	15.40	15.03	14.72	13.13
Ministry	0.33	0.31	0.16	0.19	0.17	0.08	0.32	0.12	0.52	0.45	0.27
Psychology	2.86	3.12	3.51	3.55	3.10	3.21	3.34	3.70	3.36	3.17	4.01
Physical Science	19.00	23.33	19.52	22.96	19.64	18.22	18.96	17.12	13.94	13.94	14.33
Social Work	2.14	2.11	2.95		2.18	2.11	2.25	2.83	3.46	2.92	2.37
Teaching	36.71	34.92	37.53	34.17	38.11	41.45	40.32	38.30	38.28	37.78	35.27
Writing	7.71	8.00	6.25	6.84	5.86	6.04	4.92	6.30	5.62	6.10	6.44
Other	5.24	5.05	5.63	5.31	6.10	4.64	5.06	6.18	7.78	10.54	13.08
Number on which percentages are based	2100	2276	3216	2674	2933	2651	2847	3428	3472	3994	3962
Number undecided	169	137	385	399	784	842	799	1188	1105	1472	1246
Total number	2269	2413	3601	3073	3717	3493	3646	4616	4577	5466	5208

Note:--Blank cells indicate that a field was not coded in that year and was included in "other."

Table 5

Percentage of Female National Merit Finalists Choosing Various College Major Fields

Major Field	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967
Art	2.90	1.92	1.32	1.71	1.72	1.44	1.47	0.71	1.36	1.69
Biology	2.85	4.16	4.88	3.98	5.50	6.69	6.63	6.34	6.57	5.09
Business	1.36	1.33	1.05	0.72	0.66	0.51	0.55	0.76	0.42	0.53
Chemistry	9.71	9.09	7.19	5.57	5.43	6.02	5.48	4.82	4.47	4.63
Education	5.62	7.23	5.83	6.17	4.47	4.20	3.30	5.40	4.03	4.59
Engineering	2.04	1.71	1.08	1.08	0.89	0.93	0.90	0.79	0.73	1.18
English	13.72	12.89	11.63	11.95	12.26	12.91	13.65	13.25	14.37	11.93
History	2.39	2.83	3.36	3.15	2.92	3.84	3.40	4.18	4.24	4.49
Home Economics	1.62	1.30	1.05	1.14	0.93	0.51	0.83	0.79	0.62	1.02
Journalism	3.28	2.42	2.85	2.67	1.99	1.57	1.58	1.83	2.17	2.08
Languages	4.77	7.23	8.78	10.37	9.94	9.42	11.45	10.73	11.34	10.10
Mathematics	11.37	13.22	15.53	14.44	13.98	17.65	16.30	13.33	13.92	15.75
Medical Technology	1.96	1.12	1.19	1.29	0.93	1.02	0.80	1.17	0.90	0.69
Music	2.47	2.45	1.86	1.47	1.92	2.02	2.03	0.94	1.62	1.94
Nursing	2.17	2.09	2.34	2.22	1.46	1.67	1.83	1.83	2.26	1.46
Philosophy, Religion	1.06	1.18	1.15	0.99	0.76	0.90	0.80	0.82	0.92	1.11
Physics	4.17	3.98	3.22	2.76	1.62	2.50	2.10	1.71	1.73	1.62
Pre-Medicine	5.45	4.16	4.75	5.27	3.88	4.77	5.33	4.61	4.49	4.31
Psychology	4.90	4.69	4.58	4.55	4.57	4.68	5.35	5.50	4.78	5.86
Social Sciences	6.09	6.01	7.22	7.61	9.71	8.26	7.25	10.58	7.86	8.73
Speech, Drama	1.45	0.27	0.71	0.93	0.76	0.58	0.83	1.17	1.04	0.97
Number on which percentages are based	2347	3389	2949	2933	3018	3122	3999	3924	4690	4317
Number undecided	66	212	124	784	475	524	617	653	757	731
Total number	2413	3601	3073	3717	3493	3646	4616	4577	5447	5048

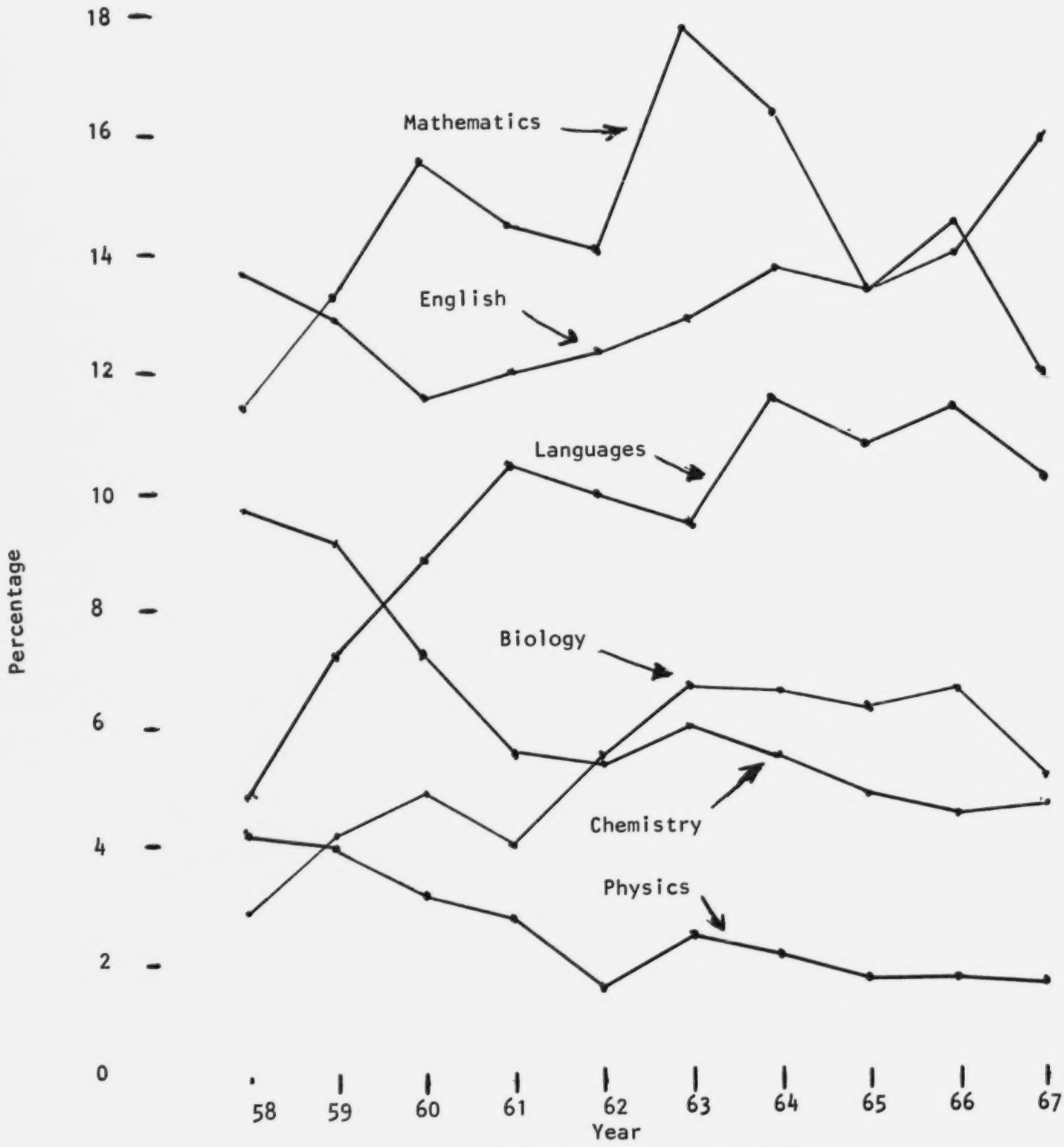

Fig. 2 Percentages of female National Merit Finalists planning to study in various fields in college

such as guidance, music, or religious education. The corresponding percentages for boys were 50, 40, and 10.

The interest of able students in the humanities can perhaps best be seen from their prospective major programs in college because specialization in the humanities is often not associated with specific career objectives. Table 3 shows that humanities majors--English, history, languages, and philosophy--were not frequently chosen by boys, although slight growth trends are apparent for both English and history. On the other hand, Table 5 shows that the humanities have considerable popularity among bright girls. Languages showed great growth in popularity from 1958 to 1961. History has also shown a persistent rise in interest among able girls, although proportionally it does not have the popularity of English or other languages.

Majors in the social sciences have increased in popularity among Finalists of both sexes since 1958, reaching a peak in 1965. Interest in the social sciences has increased as interest in engineering and the physical sciences has decreased. However, since a decrease of interest in one area is of necessity accompanied by an increase in other areas, this is difficult to interpret.

It is difficult to detect clear trends in the selection of helping professions like social work (and perhaps psychology) among these able students.

Two other trends deserve mention. Since 1957, an increasing proportion of each sex indicated career interests in law and medicine, while declining popularity was observed for business. Like teaching, the codes for the early years did not permit differentiation of various medical specialties. In 1967, however, 87 percent of boys with career choices in the medical area indicated that they planned to become physicians, 5 percent dentists, and the rest scattered among the remaining health professions. Of the girls choosing medical careers in 1967, 53 percent planned to become physicians, 19 percent nurses, 12 percent medical technicians, and the rest scattered among the remaining health specialties.

Summarizing the overall pattern of career selection from 1957 to the present, interest among boys in the physical sciences increased immediately after Sputnik then declined until about 1963 when it stabilized close to the level enjoyed just prior to the first space probes. Interest in the social sciences has been almost the mirror image of the physical sciences: declining in 1958 and 1959 but increasing until 1965 and declining slightly since then. The choice of engineering decreased sharply after 1957 but began to stabilize about 1962 and has been relatively steady since. Interest in teaching among both sexes increased until about 1962. Since then able girls have shown a declining interest in teaching while the interest in teaching among boys has changed little. Business and other practical fields have shown steady declines, the reverse of the increasing trend of interest in the humanities.

Discussion

These trends seem to reflect real changes rather than just chance fluctuations. Most of the year to year changes are statistically significant, particularly those involving marked shifts, and many of the trends have persisted in the same directions for a number of years. If the career choice of Merit Finalists are representative of students in the top one percent of measured academic ability, many of the temporal shifts in interest are large enough to have a pronounced effect on the availability of talented people to work on the problems identified with various career fields.

Probably leaders in every field are convinced that their particular speciality requires a greater proportion of the top talent than they have gotten in the past. Thus one's perception of whether the observed trends are desirable or undesirable is likely to depend on where his individual allegiances lie.

Perhaps of greater consequence are the reasons for the observed distribution of career choices among the available alternatives and the factors

determining the shifts of interest over time. Unfortunately, the present data offer few clues concerning the underlying decision making process. It is known, however, that numerous factors affect this complex phenomenon, and that those influencers which heavily affect the decisions reached by one student may not enter into another's decision at all. In essence, a person's career choice appears to be determined in part by his interest patterns, which tend to be stable over time and which are caused by some unknown combination of genetic factors and environmental experiences. Career choice may also be influenced by other factors such as family expectations, persuasive advisors, the example of peers etc. Still another variable which may affect career choice is a person's perception of the economic and other rewards offered by the various fields; although in the case of students who are some years away from entering their profession, the perception of the work involved and the rewards offered may be quite unrealistic.

Recruiting by the various career fields may influence the career choices of able youth. Clearly, in the last decade we have witnessed more intensive recruiting campaigns for top talent than ever before. It is interesting, for example, that particularly strong compaigns have been waged in recent years to attract men into engineering and women into teaching. Nevertheless, although the talent shortages in both of these fields have been widely publicized and corresponding salary increases offered, rather than attracting proportionally more students the trend of interest in these fields has not increased. This appears to provide some evidence that the decisions of large segments of these highly intelligent students cannot be easily manipulated by efforts of this type.

In summary, we may draw this conclusion: we can be reasonably certain that various trends have occurred in the past decade in the career selection patterns of highly able youth, but the manner in which factors interact to produce the

observed distribution of students among fields is largely unknown. The flow of talent into different career fields is a remarkably complex phenomenon, and many of those in manpower planning positions eager to stem the tide in one direction or another have not been altogether successful.

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